CLAIMS

What is claimed is:

1. A Helmholtz resonator comprising:

a chamber at least partially defining a cavity;

a neck in said chamber and having a passage in fluid communication with said cavity, said chamber and neck producing a passive response to a sound wave; and

an active resonator disposed within said chamber, said active resonator producing a forced response for supplementing said passive response.

2. The Helmholtz resonator according to claim 1, wherein said neck is a tubular structure extending from said chamber.

3. The Helmholtz resonator according to claim 1, wherein said active resonator is a loudspeaker.

4. The Helmholtz resonator according to claim 3, wherein said loudspeaker is a woofer.

5. The Helmholtz resonator according to claim 3, wherein said chamber includes a flange with said loudspeaker supported thereon, and said loudspeaker having a diaphragm disposed within an opening in said flange for producing said forced response.

6. The Helmholtz resonator according to claim 5, wherein said flange includes at least one pressure equalization port there through in fluid communication with said cavity.

7. The Helmholtz resonator according to claim 6, wherein said flange is arranged opposite said neck.

8. An induction noise attenuation system for a combustion engine comprising:

a portion of an air induction system defining a passageway carrying a sound wave;

a Helmholtz resonator having a chamber at least partially defining a cavity and a neck in said chamber fluidly connecting said portion of said air induction system and said cavity, said chamber and said neck producing a passive response to said sound wave;

an active resonator disposed within said chamber; and

a driver connected to said active resonator producing a signal for driving said active resonator and producing a forced response for supplementing said passive response.

9. The system according to claim 8, wherein said driver includes a signal source that detects a speed of the combustion engine for synchronizing said forced response relative to said speed.

10. The system according to claim 9, wherein said signal source is engine RPM.

11. The system according to claim 9, wherein said driver includes a phase compensator for synchronizing said forced response approximately 180° out of phase with said sound wave.

12. The system according to claim 9, wherein said driver includes an amplifier for amplifying a signal from said signal source.

13. The system according to claim 8, wherein said passageway is arranged between an intake manifold and a throttle body.

14. The system according to claim 8, wherein said active resonator is a loudspeaker.

15. A method of attenuating noise in an induction system comprising:

a) sensing an engine speed;

b) producing a phase compensated engine speed signal;

c) driving a loudspeaker with the phase compensated engine speed signal; and

d) propagating a sound wave with the loudspeaker to attenuate the noise in the induction system.

16. The method according to claim 15, further including the step of:

e) amplifying the engine speed signal.

17. The method according to claim 15, further including the step of:

f) propagating a passive sound wave with a Helmholtz resonator, wherein step d) supplements the passive sound wave.

18. The method according to claim 17, wherein step b) includes determining a loudspeaker response.

19. The method according to claim 17, wherein step b) includes determining a Helmholtz resonator cavity response.

20. The method according to claim 17, wherein step b) includes determining a Helmholtz resonator neck response.